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HexSim Final Steps

1 message

Nathan Schumaker <[redacted]> **Thu, Aug 5, 2010 at 10:34 AM**

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I've been working closely with Bob and Jeff this week to try and finish the HexSim fine tuning. I'm not quite there yet. I'm just trying to find the right per-province resource targets to use, that's all. These should correlate with the resource quality, or density, in each province.

I'll separate my comments into issues below, but they are all related:

ISSUE 1

Most recently, I've used the following table of relative values to scale each province's resource target:

WA Olympic	3.5
WA Cascades	1.5
OR Cascades	1.167
OR Coast Range	1.33
OR Klamath	0.83
CA Klamath	1
CA Redwood	0.5

These values equal the minimum home size / CA Klamath min home range size. I've then multiplied each value by 500, 550, 600, 650, 700 to obtain 5 different HexSim scenarios.

I've attached a plot of the population sizes that result from these 5 scenarios. See "PopSize.pdf".

Bob looked carefully at the per-Modeling-Region population sizes for the scenario called "Baseline J", which uses the coefficient 500. He felt that the regional population sizes and trends were not accurate yet.

This argues for modifying the table above. But I need help doing this in a defensible way. Based on Bob's comments, I think we may want scaling values more like:

WA Olympic	2.5
WA Cascades	2.0
OR Cascades	1.5
OR Coast Range	1.25

OR Klamath	1.5
CA Klamath	1.5
CA Redwood	1.0

I have just made these numbers up -- they are only intended to get you thinking about this relative resource value issue on a per-province basis.

Alternatively, we could set the resource target scaling values on a per-Modeling-Region basis. That would permit even more fine-tuning. But its more work, and may be harder to justify. I have attached the modeling region-specific weights corresponding to the top table, and the range of resource coefficients [500, 550, 600, 650, 700]. See "Resource Targets.pdf". You have probably all seen this before.

ISSUE 2

What I've been doing thus far is to set these per-province scaling values based on observed home range sizes, and then multiply each by a coefficient. The file "Resource Targets.pdf" illustrates this for 5 different coefficients. We don't have to do it this way. A resource target could be selected directly for each province or modeling region. The higher the target, the lower the population will be in that region. As a refresher, each owl will attempt to acquire resources equal to its resource target. If it gets 1/3 or less, its placed in a low resource class. If it gets 2/3 or more its placed in a high resource class. The rest go in a moderate resource class. Survival varies with resource class.

It would be ideal to simply arrive at absolute resource values on a per-region basis. That would amount to adding a new column to the "Resource Targets.pdf" file -- one that had values you thought made the most sense. But the approach outlined under issue 1, above, is certainly adequate too.

Bob pointed out that the populations on OLY, TYE, and COA seemed to be disappearing, while populations on RAI, Warm Springs, and WEN were not. This did not mesh with the observations that TYE, KLA, SCA, and HOOPA appear to be the most stable sub-populations.

Modifying the resource targets on a per-modeling-region basis may be the only way to fix this. We are already modifying the home range size and likelihood of barred owl encounters per-modeling-region (Bob, all of that work you and Katie did is definitely folded in to all of these scenarios -- thanks!).

ISSUE 3

Jeff and I came up with a possible approach to selecting one set of resource targets from a group. We did this using the scenarios corresponding to the data in the "Resource Targets.pdf" file.

The idea is predicated on two statements:

1. Today's population size is likely between 3000 and 3500 female owls.
2. At present, the population is declining range-wide at about 3% per year.

What I did was to make plots of instantaneous lambda vs population size for each of the 5 simulations corresponding to the resource target groups in "Resource Targets.pdf". Scenarios J and K (coefficients 500 and 550) didn't have any points that fell in the region corresponding to the 2 criteria above. But if I ran multiple replicates, I may see some appear. However, scenarios L, M, N all did. See the attached file "Lambda.pdf".

I'm computing Instantaneous Lambda as N(t+1) / N(t), where N is the population size. But also, this value is high in even years and low in odd years, so the data I'm using here is an average of each paired even and odd year.

My question is, do you think this sort of analysis will be useful in the fine-tuning process?

ISSUE 4

Bob also had some other concerns. One concerned year to year variability in survival.

I recently sent a plot of survival rates through time. Survival in these simulations is a function of stage class (4 levels), resource class (3 levels), and barred owl presence / absence. That gives a total of 24 different survival values. For simplicity, I just displayed the grand mean. It wasn't very informative, but Bob pointed out that there was a lot of year-to-year variability in those survival values.

I made a few more specific plots of survival rate in time. For example adult / high resource / barred owl absent. In a quick scan, I found that there was still a fair bit of year to year variability in survival. I suspect this is because, even in this more specific case, we are still averaging across the entire range, including floaters and territorial birds.

But we may want to look at this further.

ISSUE 5

Bob also indicated some concern because I sent around a plot that seemed to show spotted owl / barred owl interactions decreasing with time -- opposite of what we actually observe. This was just a consequence of my being in a hurry and not doing a very good job of developing plots. If you take the same data and remove the population trend, then the interaction frequencies tend to be roughly constant once the model reaches steady state. This is what you'd expect, given that we are modeling a constant regional probability of encounters.

We can easily make the encounter rate dynamic. But that's up to you.

SUMMARY

Given everything discussed above, I think all we really need now is to settle of a set of resource targets. It takes about 2 hours to run a simulation, and I can run several simultaneously. So I can experiment and then send back plots of population size (overall, by region, and by DSA).

I'm sorry this email message is so long... It just seemed like an important time to summarize where we are at.

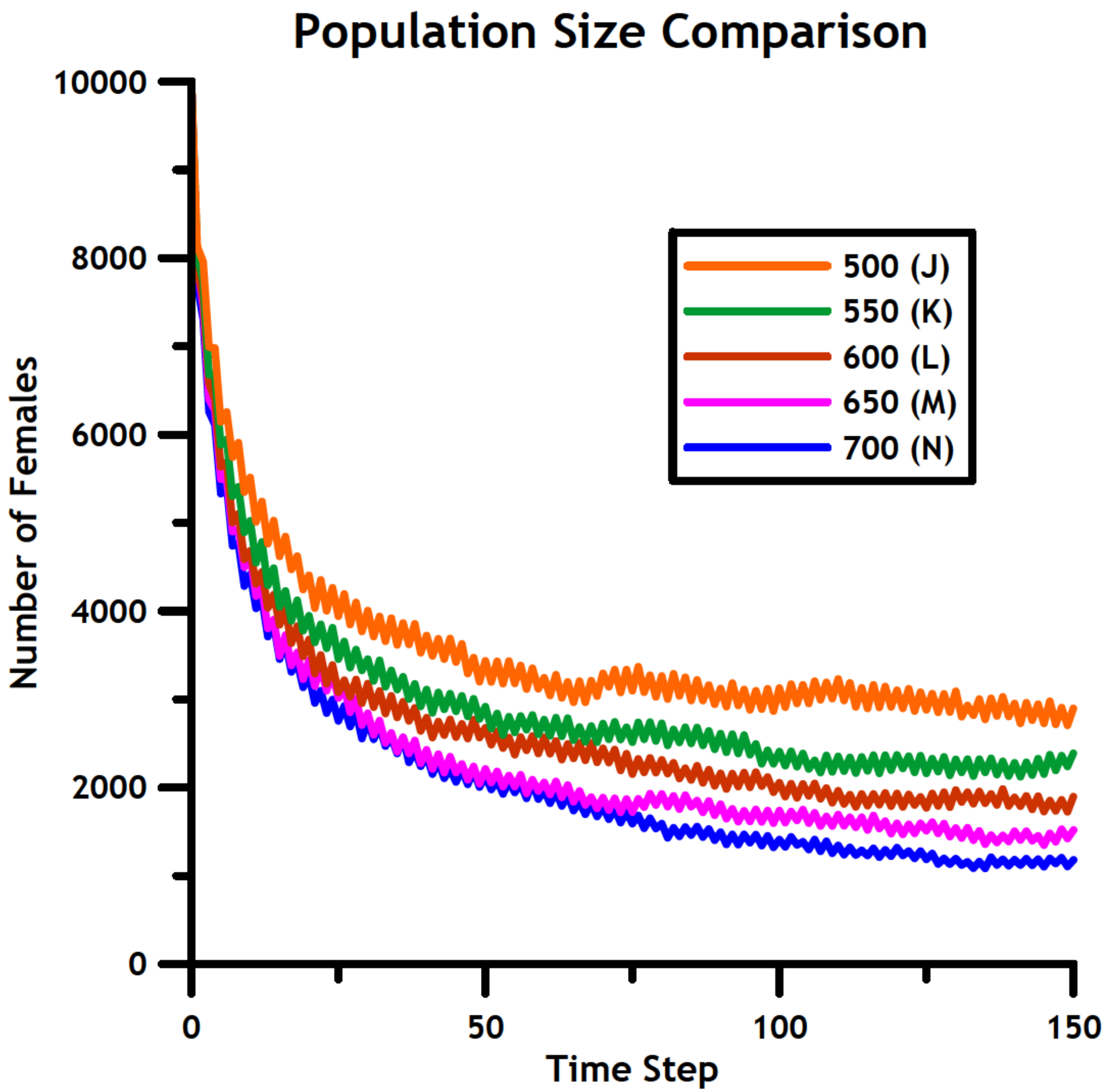
Nathan

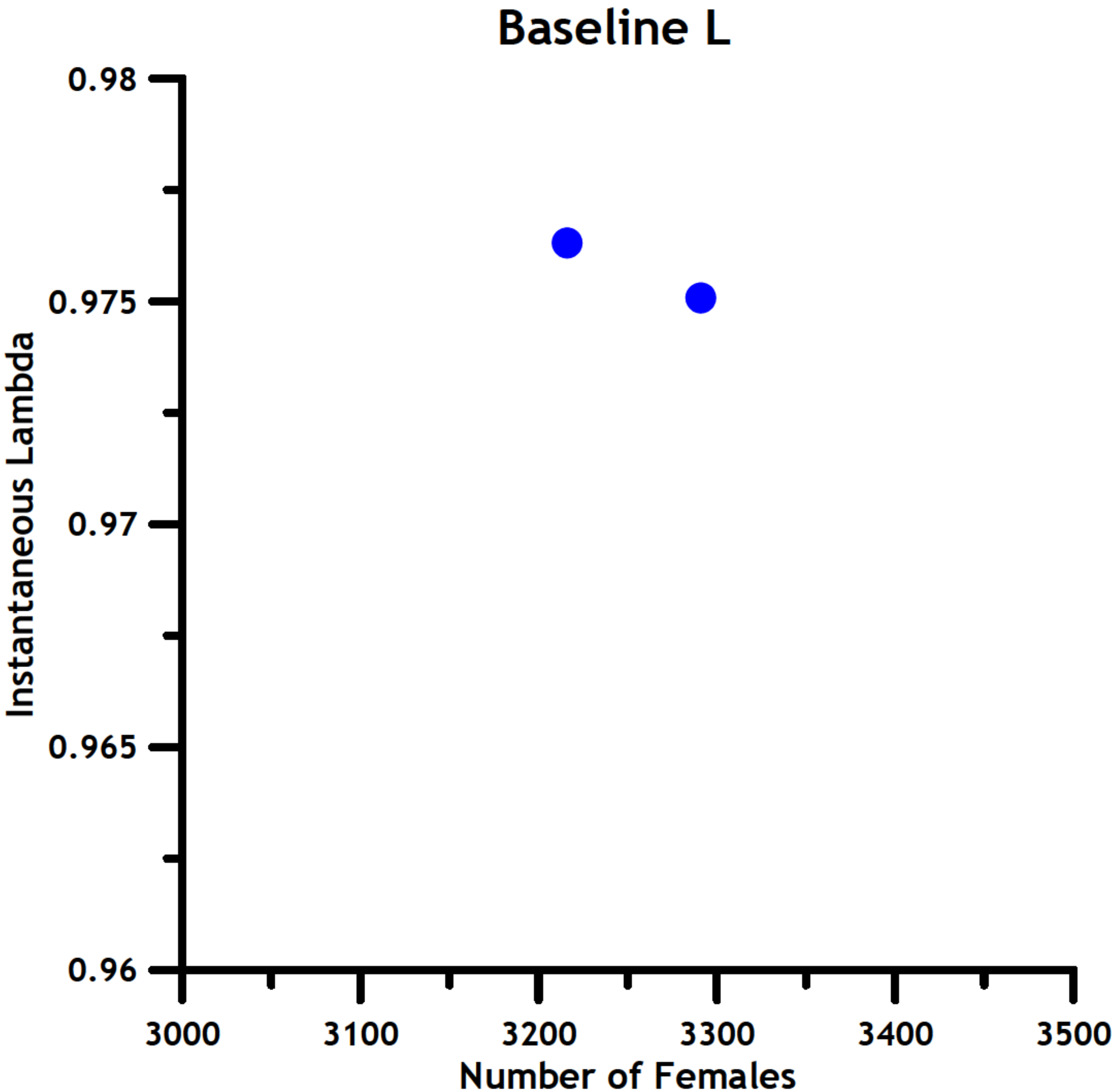
3 attachments

PopSize.pdf
21K

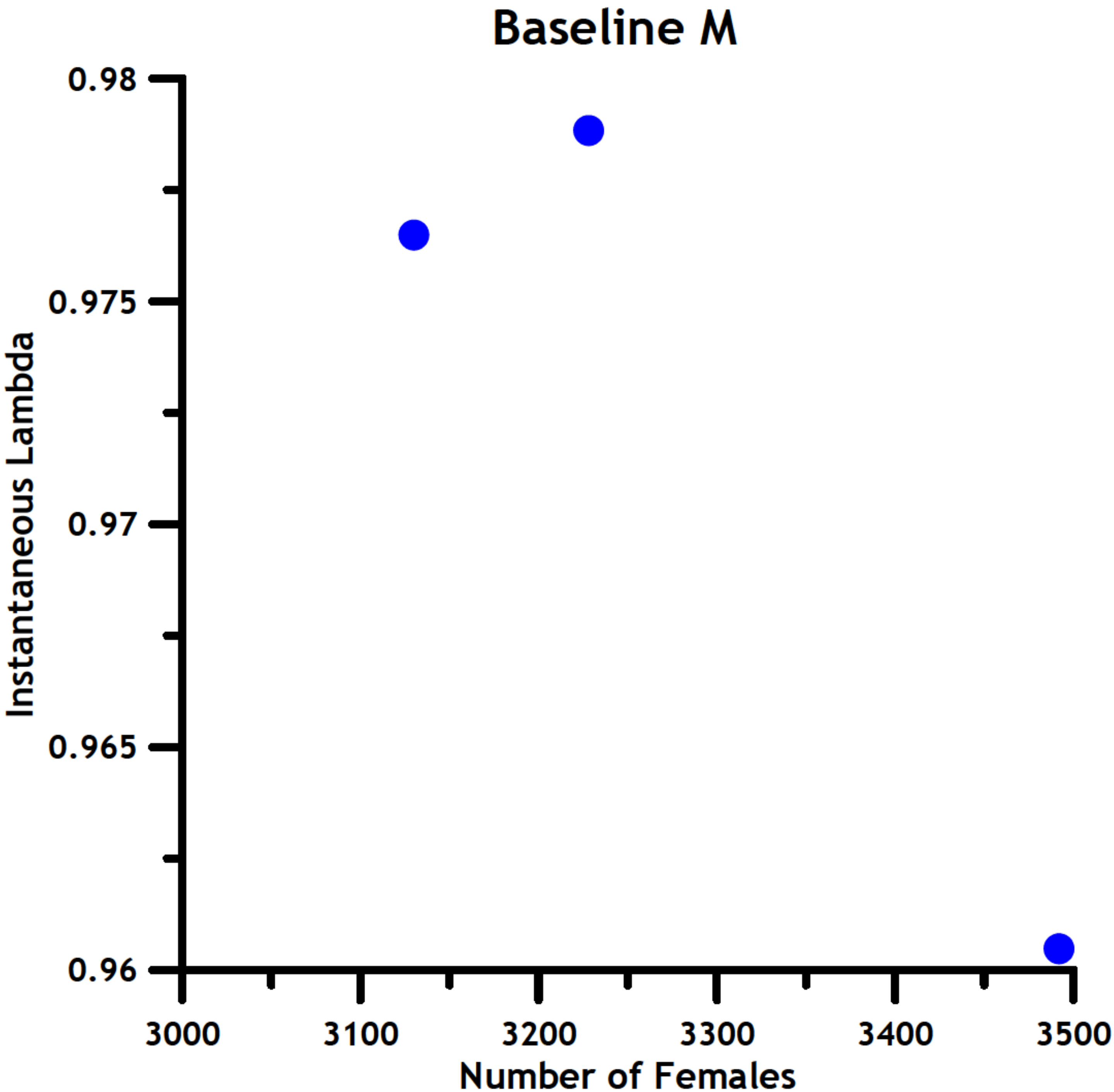
Lambda.pdf
24K

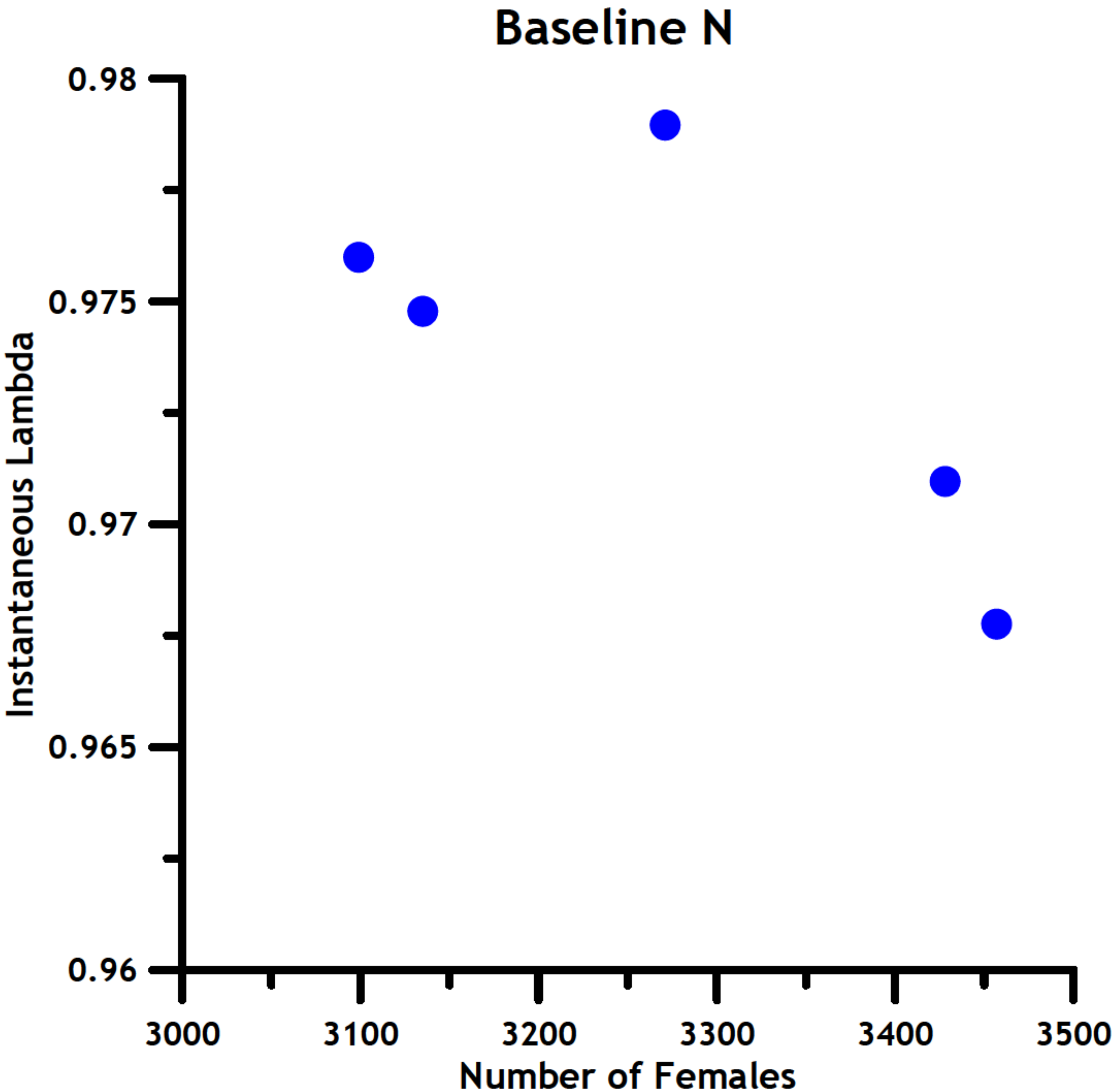
Resource Targets.pdf
47K


Population Size Comparison
10000
8000
6000
4000
2000
0
0
50
100
150
Time Step
Number of Females
500 (J)
550 (K)
600 (L)
650 (M)
700 (N)



Baseline L
Instantaneous Lambda
0.98
0.975
0.97
0.965
0.96
3000
3100
3200
3300
3400
3500
Number of Females


Baseline M
Instantaneous Lambda
0.98
0.975
0.97
0.965
0.96
3000
3100
3200
3300
3400
3500
Number of Females


Baseline N
0.98
0.975
0.97
0.965
0.96
Instantaneous Lambda
3000
3100
3200
3300
3400
3500
Number of Females

Modeling Region	Province	Minimum Home Range Size	J 500 * [Min Home Range] / 6	K 550 * [Min Home Range] / 6	L 600 * [Min Home Range] / 6	M 650 * [Min Home Range] / 6	N 700 * [Min Home Range] / 6
North Coast Olympics	WA Olympic	21	1750	1925	2100	2275	2450
Oregon Coast	OR Coast Range	8	667	733	800	867	933
East Cascades South	OR Klamath	5	417	458	500	542	583
East Cascades North	WA Cascades	9	750	825	900	975	1050
West Cascades North	WA Cascades	9	750	825	900	975	1050
West Cascades Central	WA Cascades	9	750	825	900	975	1050
West Cascades South	OR Cascades	7	583	642	700	758	817
Klamath East	OR Klamath	5	417	458	500	542	583
Klamath West	OR Klamath	5	417	458	500	542	583
Inner CA Coast Range	CA Klamath	6	500	550	600	650	700
Redwood Coast	CA Redwood	3	250	275	300	325	350
Puget Willamette North	WA Cascades	9	750	825	900	975	1050
Puget Willamette West	OR Cascades	7	583	642	700	758	817
Puget Willamette East	OR Cascades	7	583	642	700	758	817